

Iowa Fine Particulate Monitoring Network Design Values 2003-2005

*Iowa DNR
Ambient Air Monitoring
Group*



What are National Ambient Air Quality Standards?

The EPA uses six "criteria pollutants" as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air Quality Standards (NAAQS). When an area does not meet the air quality standard for one of the criteria pollutants, it may be subject to the formal rule-making process which designates it as nonattainment. The six criteria pollutants are:

Ozone

Sulfur dioxide

Lead

Carbon monoxide

Nitrogen Dioxide

Particulate Matter

The particulate matter standard encompasses two classifications according to the size of the particulate, **PM10** and **PM2.5**.

What is Particulate Matter?

The term “particulate matter” (PM) includes both solid particles and liquid droplets (excluding water droplets) that are found in outdoor air. Particulate matter may be emitted directly into the air or can form from pollutants that react in the atmosphere. Small particles tend to pose the greatest health concern because they can be inhaled into and accumulate in the respiratory system.

Particles of less than 10 microns in diameter are referred to as PM₁₀. Particles of less than 2.5 microns in diameter are referred to as fine particulate or PM_{2.5}.

Sources of PM_{2.5} emissions include all types of combustion (motor vehicles, power plants, wood burning, etc.) and some industrial processes. Secondary PM_{2.5} is produced in the atmosphere away from sources through atmospheric chemistry. Sources of particles that are smaller than PM₁₀ but larger than PM_{2.5} include crushing or grinding operations, and dust from paved or unpaved roads.

How is Particulate Matter Measured?

Iowa operates two distinct types of PM samplers. One type collects the aerosol by drawing ambient air through a filter over a 24-hour period. The filters are then returned to an analytical laboratory where they are weighed. This process provides accurate concentrations, but the data is not available to the public until the analytical work is complete, usually about a month after the sampling date. In order to provide more timely information, Iowa operates continuous samplers that measure PM10 and PM2.5 in real-time.

There are currently no continuous PM2.5 samplers designated by EPA as equivalent to filter based methods for determining attainment. EPA encourages use of continuous PM2.5 monitors for reporting 'real-time' values when the data can be shown to be well correlated with the data from filter samplers. This report does not include data from continuous PM2.5 samplers.

What is the Fine Particulate Matter Standard?

Two primary PM_{2.5} standards were established by EPA in 1997 for the protection of public health. The annual standard is met when the 3-year average of a site's annual mean concentration is 15.0 µg/m³ (micrograms per cubic meter) or less. The 24-hour or daily standard is met when the 3-year average of a site's annual 98th percentile values is 65 µg/m³ or less. The secondary PM_{2.5} standards, established for the protection of public welfare and the environment, are the same as the primary standards. The 3-year averages (of annual means or 98th percentiles) are called design values. A design value is only valid if minimum data completeness criteria are met.

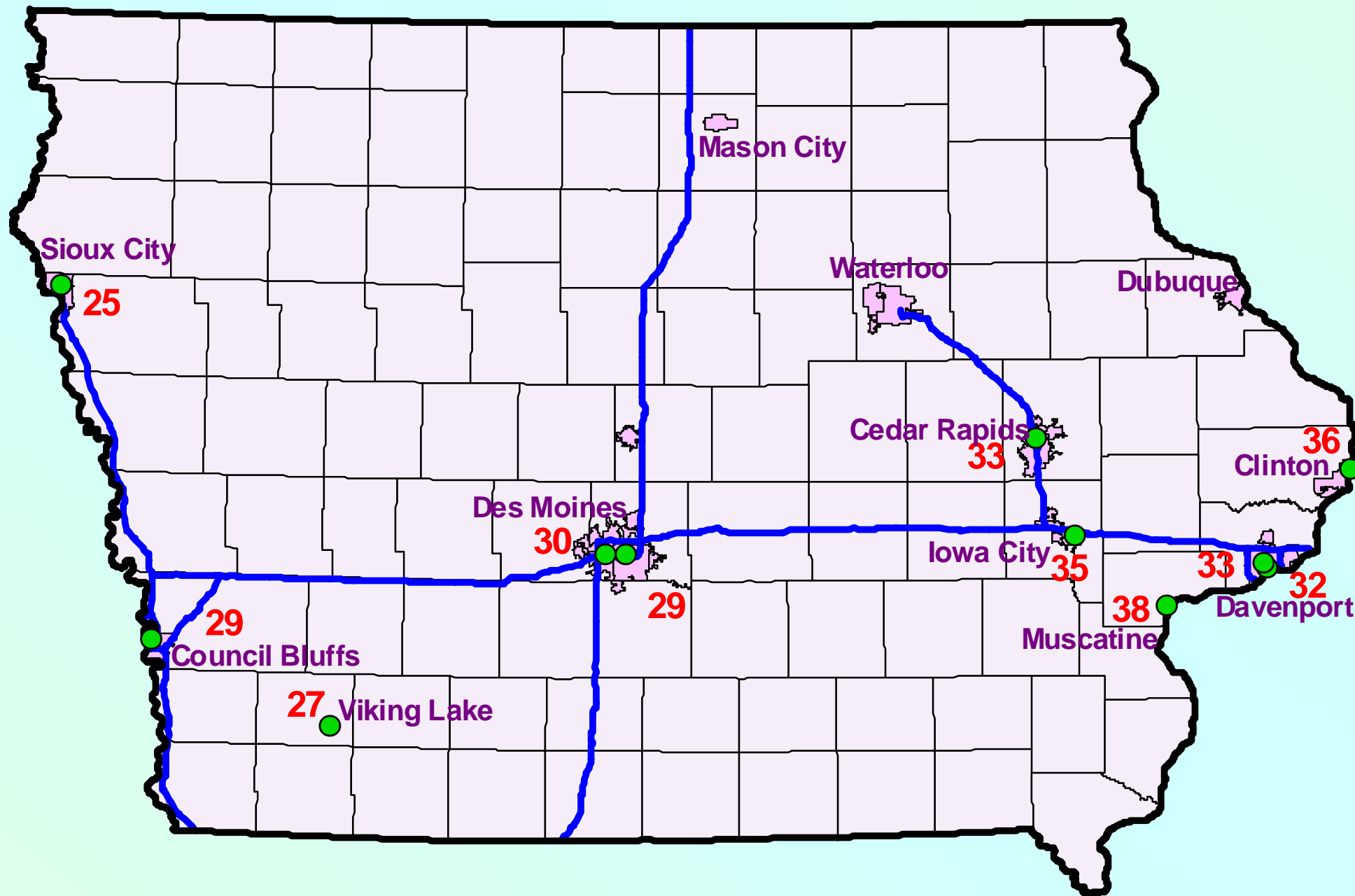
What is the Design Value?

A design value is a tool that can be used to understand pollution levels in a specific location. A design value may be set for any pollutant. The U.S. EPA's official definition is explained this way: "a design value is the mathematically determined pollutant concentration at a particular site that must be reduced to, or maintained at or below the National Ambient Air Quality Standard to assume attainment." The design value number tells us how a particular site or area compares with the National Ambient Air Quality Standards (NAAQS).

Iowa design values and the level of the standard for both averaging periods are included on the following pages.

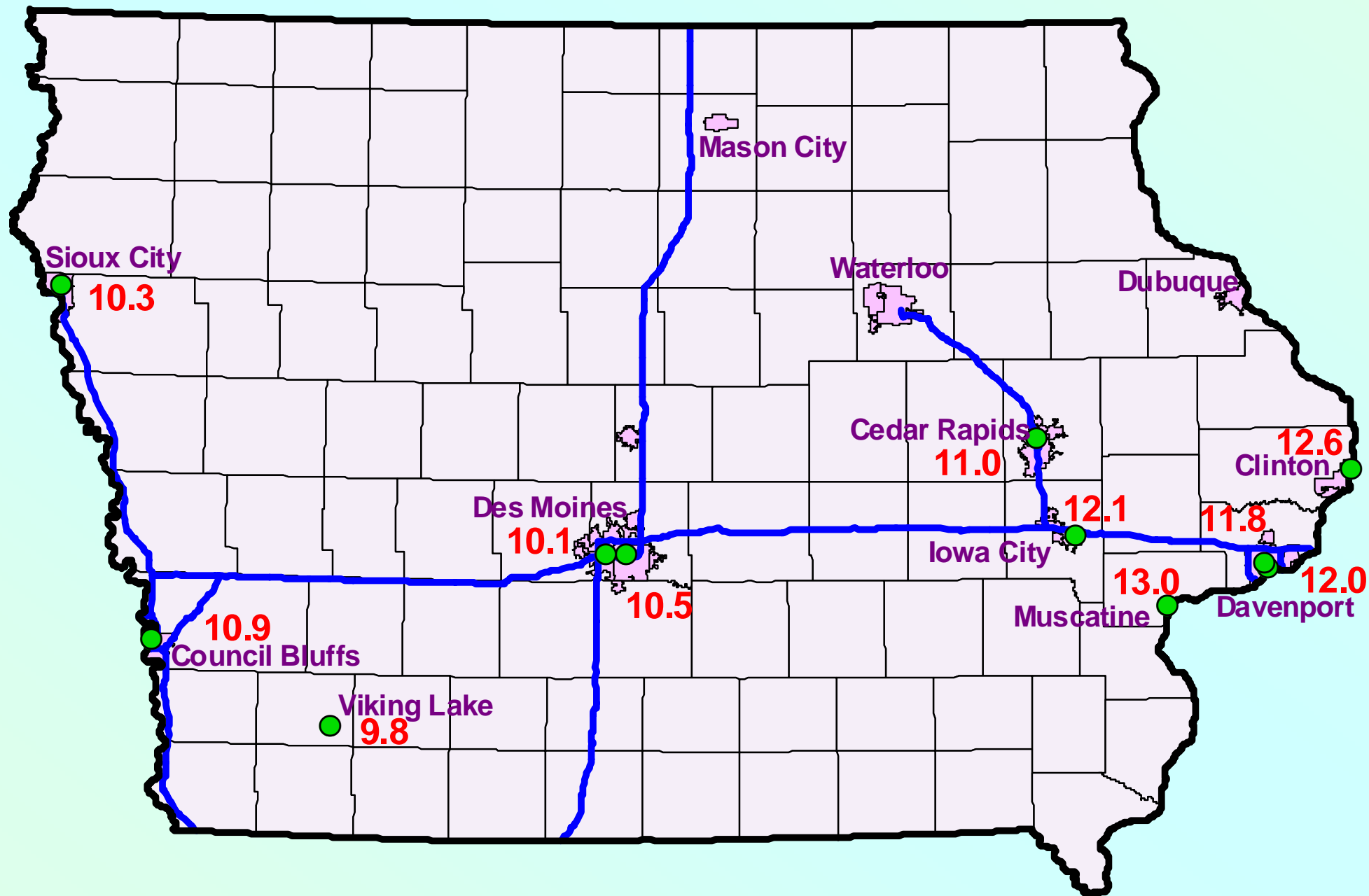
Iowa PM2.5 24-hour Design Values 2003-2005

(NAAQS Standard is $65 \mu\text{g}/\text{m}^3$)

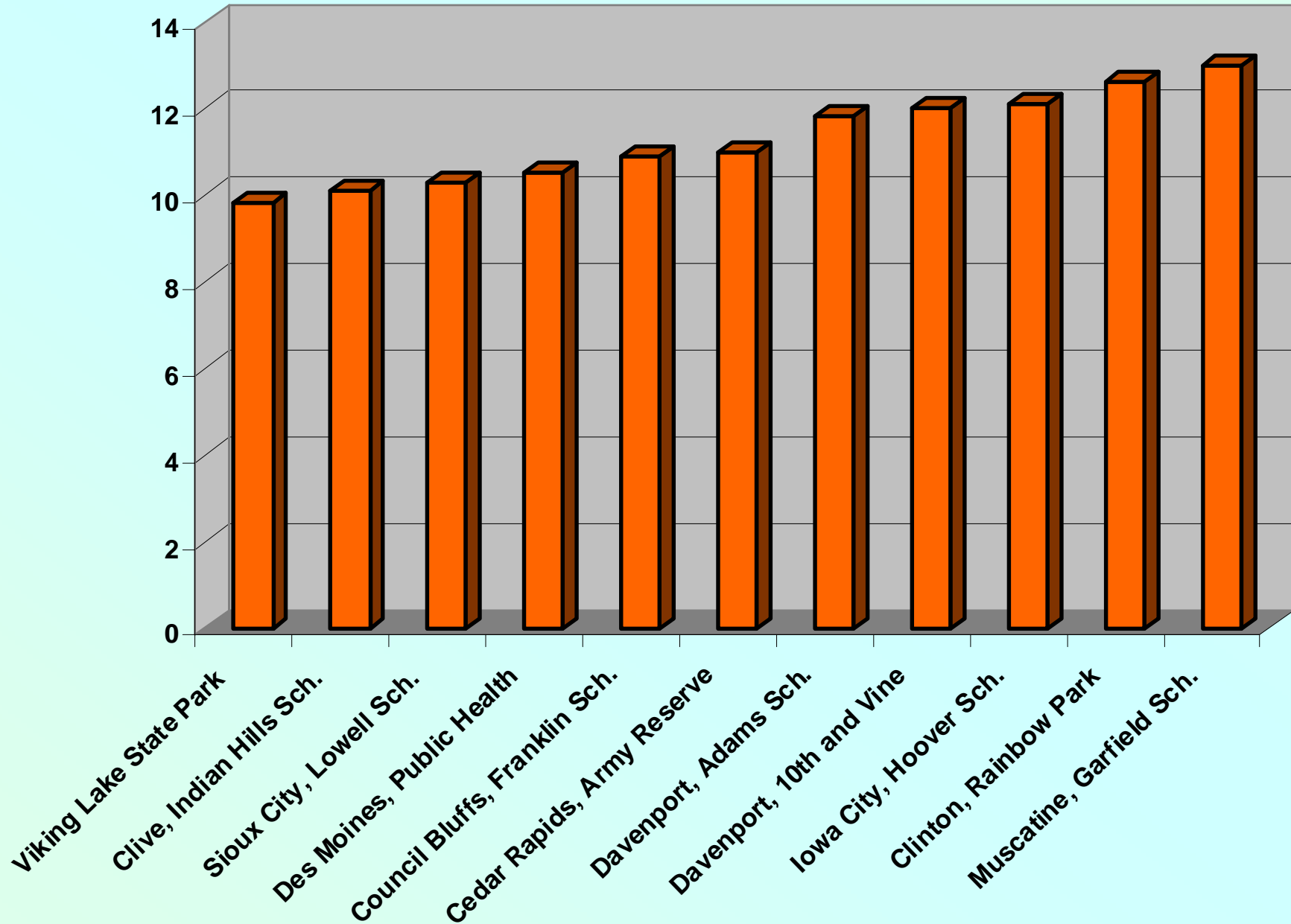


Iowa PM2.5 Annual Design Values 2003-2005

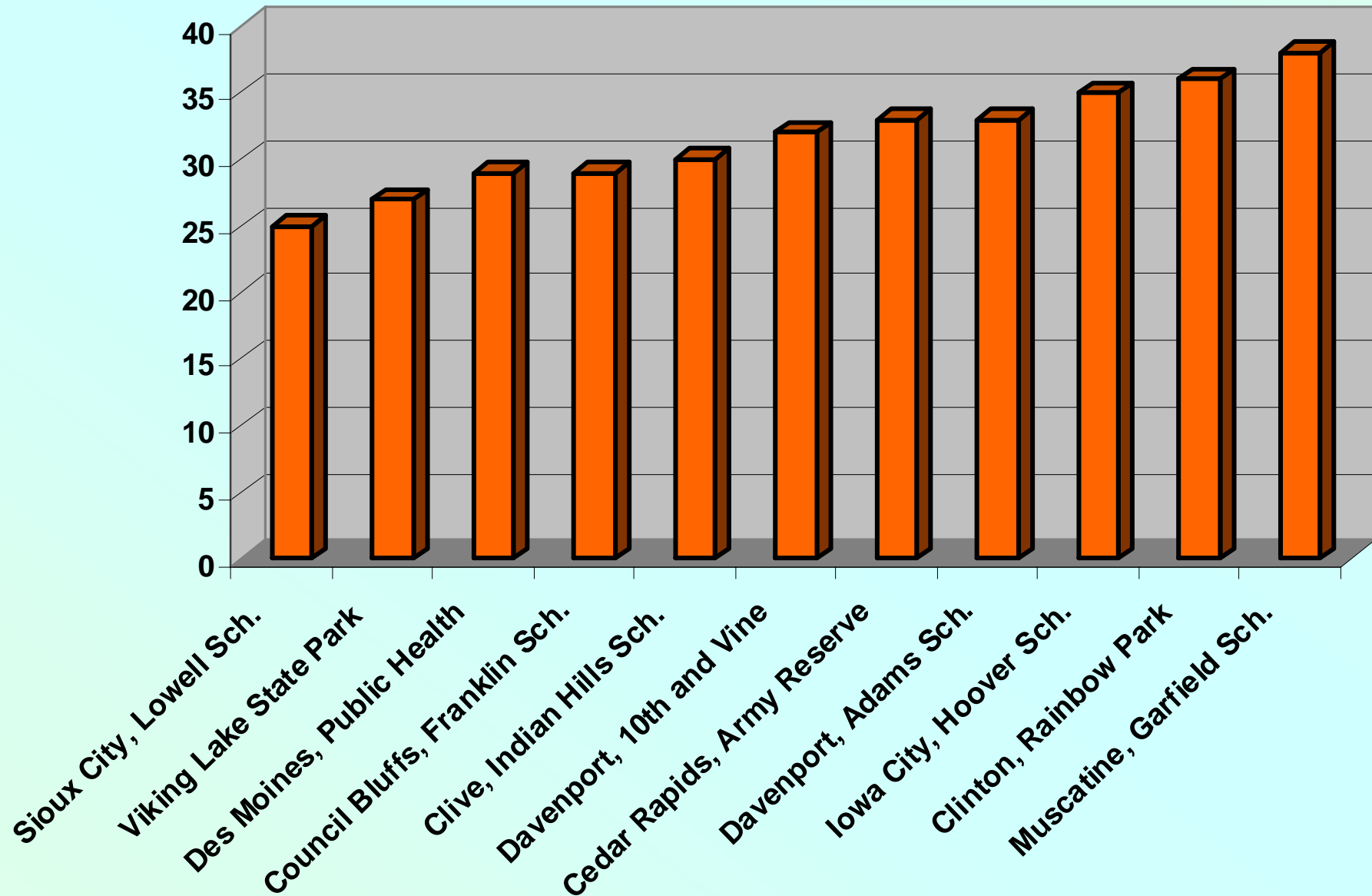
(NAAQS Standard is 15 $\mu\text{g}/\text{m}^3$)



Annual PM2.5 Design Values 2003-2005



24-hr. PM2.5 Design Values 2003-2005



Iowa PM_{2.5} Attainment Calculations 2003-2005

County	City	EPA Monitor Id	Year	Annual 98th percentile (ug/m3)	3-year average 98th percentile (ug/m3)	Annual averages (ug/m3)	3-year average annual average (ug/m3)
Clinton	Clinton	190450021	2003	33.5	36	12.4	12.6
			2004	34.5		11.3	
			2005	39.7		13.9	
Johnson	Iowa City	191032001	2003	27.3	35	11.8	12.1
			2004	37.4		11.0	
			2005	41.0		13.6	
Linn	Cedar Rapids	191130037	2003	34.7	33	11.0	11.0
			2004	29.9		10.1	
			2005	35.4		11.8	
Montgomery	Red Oak	191370002	2003	23.8	27	9.6	9.8
			2004	24.5		8.7	
			2005	33.0		11.1	
Muscatine	Muscatine	191390015	2003	37.9	38	13.2	13.0
			2004	38.4		11.8	
			2005	36.8		13.9	
Polk	Des Moines	191530030	2003	28.0	29	10.5	10.5
			2004	24.7		9.9	
			2005	34.4		11.3	
Polk	Clive	191532510	2003	30.5	30	10.7	10.1
			2004	29.1		9.2	
			2005	28.9		10.5	
Pottawattamie	Council Bluffs	191550009	2003	25.2	29	11.0	10.9
			2004	31.5		9.4	
			2005	30.0		12.5	
Scott	Davenport	191630015	2003	32.4	32	12.1	12.0
			2004	27.2		10.9	
			2005	36.7		13.0	
Scott	Davenport	191630018	2003	30.9	33	12.0	11.8
			2004	32.2		10.5	
			2005	36.8		12.9	
Woodbury	Sioux City	191930017	2003	29.0	25	10.8	10.3
			2004	21.9		9.4	
			2005	25.2		10.6	

Note: 24-hour NAAQS level is 65 ug/m³, Annual NAAQS level is 15 ug/m³.

Sites without enough data to calculate summary statistics have been excluded from this report.

Web Resources

Iowa Real-time Data Reporting :

In Polk County:

<http://www.airquality.co.polk.ia.us/Default.aspx>

In Linn County:

<http://www.air.linn.ia.us/>

Outside Polk and Linn Counties:

<http://www.uhl.uiowa.edu/services/environment/airquality/ambient/index.html>

Design Values for All Pollutants Nationwide:

<http://www.epa.gov/airtrends/values.html>

Ozone Maps:

<http://www.epa.gov/airnow/index.html>

Historical Air Pollution Data for Iowa and Other States:

<http://www.epa.gov/air/data/>